

REMARKS

Claims 1 to 26, as amended, as amended, and new claims 43 to 46 appear in this application for the Examiner's review and consideration. Claims 27 to 42 are canceled by this Amendment without prejudice to Applicants rights to file one or more divisional applications directed to the subject matter of those claims. The new claims and the amendments are fully supported by the specification and claims as originally filed. Therefore, there is no issue of new matter.

Applicants acknowledge with appreciation the courtesies shown to their representative, Alan Force (Reg. No. 39,673), by Examiners Dustin Q. Dam and Alex Noguerola in a telephonic interview on January 28, 2009. The comments set forth herein are in accordance with that interview.

Claims 1 to 7, 9, 10, 13, 15, 16, 17, 19 to 22, and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,214,191 to Wiktorowicz et al. (Wiktorowicz) for the reasons set forth on pages 2 to 7 of the Office Action;

Claims 8, 14, 18, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wiktorowicz in view of U.S. Patent No. 4,959,133 to Adcock for the reasons set forth on pages 8 to 11 of the Office Action; and

Claims 11, 12, 25, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wiktorowicz in view of U.S. Patent No. 6,162,602 to Gautsch for the reasons set forth on pages 11 and 12 of the Office Action.

In response, Applicants submit that, as recited in claim 1, the presently claimed invention is directed to an integrated microfluidic device. The presently claimed device comprises a sample loading chamber and a fluid reservoir connected by a microfluidic channel, where the microfluidic channel comprises an inlet and an outlet, and the sample loading chamber is configured for loading a sample of charged molecules into the microfluidic device. The sample loading chamber is positioned at the inlet of the microfluidic channel, and comprises a first electrode and a second electrode configured to generate a first electric field in the sample loading chamber, where, when generated, the first electric field is configured to transfer charged molecules in the sample loading chamber to the inlet of the microfluidic channel. The fluid reservoir is configured for unloading a sample of separated charged molecules from the microfluidic device, is

positioned at the outlet of the microfluidic channel, and comprises a third electrode configured to generate a second electric field with at least the second electrode.

Claim 5, as amended, differs from claim 1 in that claim 5 recites that the sample loading chamber comprises a section of matrix material comprising charged molecules in the sample loading chamber. Therefore, the presently claimed fluid reservoir recited in claims 1 and 5 is configured for unloading a sample of separated charged molecules from the microfluidic device.

In contrast to the fluid reservoir of the presently claimed device, Wiktorowicz discloses a slot 140 containing an electrode that the Final Office Action states is connected to the microfluidic channels 170. The Final Office Action further states that the slot 140 corresponds to the fluid reservoir of the presently claimed device, and, thus, is configured for unloading a sample of charged molecules from the device disclosed by Wiktorowicz.

However, as discussed above, claims 1 and 5, as amended, recite that the fluid reservoir is configured for unloading a sample of separated charged molecules from the microfluidic device. Applicants submit that if the slot 140 disclosed by Wiktorowicz is in fluid communication with the microfluidic channels 170 in the disclosed by Wiktorowicz, upon entering the slot 140, any molecules separated by the device will mix, and will, thus, not be separated upon entering the slot 140. As a result the slot 140 in the device disclosed by Wiktorowicz is not configured for unloading a sample of separated charged molecules from the disclosed device, as is the fluid reservoir of the presently claimed device, as recited in claims 1 and 5, as amended.

With regard to claim 15, that claim, as amended, is directed to an integrated microfluidic device comprising a sample unloading chamber and a fluid reservoir connected by a microfluidic channel. The microfluidic channel comprises an inlet and an outlet, and the sample unloading chamber is configured for unloading a sample of charged molecules from the microfluidic device. The sample unloading chamber is positioned at the outlet of the microfluidic channel, and comprises a first electrode and a second electrode configured to generate a first electric field in the sample unloading chamber, where, when generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the sample unloading chamber. The sample unloading chamber defines an opening in the microfluidic device, where at least a portion of the first and second electrodes is in the opening, and the fluid reservoir is

positioned at the inlet of the microfluidic channel, and comprises a third electrode configured to generate a second electric field with at least the second electrode.

The Final Office Action states that Wiktorowicz discloses a sample unloading chamber 160 that is structurally capable of unloading a sample of charged molecules from the disclosed device, and having electrodes in ports 132 and 135. However, the chamber 160 disclosed by Wiktorowicz does not define an opening in the microfluidic device, wherein at least a portion of the electrodes 132 and 135 is in the opening. Therefore, Wiktorowicz does not disclose the presently claimed device, as recited in claim 15.

With regard to claim 20, that claim, as amended, is directed to an integrated microfluidic device. The claimed device comprises a sample unloading chamber and a fluid reservoir connected by a microfluidic channel, where the microfluidic channel comprises an inlet and an outlet, the sample unloading chamber is configured for unloading a sample of charged molecules from the microfluidic device, and is positioned at the outlet of the microfluidic channel. The sample unloading chamber comprises a first electrode and a second electrode configured to generate a first electric field in the sample unloading chamber, and a section of matrix material in the sample unloading chamber, where the matrix material is only present in the sample unloading chamber. When generated, the first electric field is configured to transfer charged molecules from the outlet of the microfluidic channel into the section of matrix material, and the fluid reservoir is positioned at the inlet of the microfluidic channel and comprises a third electrode configured to generate a second electric field with at least the second electrode.

In contrast to the presently claimed device, Wiktorowicz discloses that, conventionally, separation takes place in a cross-linked matrix, and discloses that matrix material has been used in the prior art for a separation medium. However, at column 2, lines 55 to 60, Wiktorowicz teaches that the disclosed “method preferably involves a flowable (liquid-state) separation medium that can be easily replaced with fresh media, so that a single apparatus can be used repetitively for multiple samples. Ideally, the apparatus is adaptable for automation.” In addition, at column 17, lines 42 to 45, Wiktorowicz discloses: “The method does not require a crosslinked matrix, and therefore is easily refilled with the same or different media for separating additional samples.”

Wiktorowicz does not disclose the use of a matrix material for separation in the disclosed device, and, in particular, does not disclose a sample unloading chamber in

which the matrix material is only present in that chamber, as presently claimed. Therefore, Wiktorowicz does not disclose the presently claimed device.

Applicants note that new claim 46 differs from claim 20, as amended, in that new claim 46 does not contain the recitation that the matrix material is only present in the sample unloading chamber. Instead, new claim 46 recites that the sample unloading chamber defines an opening in the microfluidic device, and at least a portion of the first and second electrodes is in the opening.

As discussed above, Wiktorowicz does not disclose a sample unloading chamber that defines an opening in the microfluidic device, where at least a portion of the first and second electrodes is in the opening, as presently claimed. Therefore, Wiktorowicz does not disclose the presently claimed device.

Therefore, as Wiktorowicz does not disclose every element of the presently claimed invention, the present claims are not anticipated by Wiktorowicz. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 1 to 7, 9, 10, 13, 15, 16, 17, 19 to 22, and 24 under 35 U.S.C. § 102(b) over Wiktorowicz.

With regard to the rejections of claims 8, 14, 18, and 23 under 35 U.S.C. § 103(a), over Wiktorowicz and Adcock, Adcock does nothing to overcome the deficiencies of Wiktorowicz. Applicants note that claims 8 and 14 ultimately depend from claim 5, claim 18 ultimately depends from claim 15, and claim 23 ultimately depends from claim 20. Adcock disclose the electrophoretic separation of molecules of DNA, RNA, and proteins in a gel. Adcock does not disclose or suggest or provide any reason for one of ordinary skill in the art to provide a fluid reservoir configured for unloading a sample of separated charged molecules from a microfluidic, as recited in claim 5, and, thus, claims 8 and 14. Adcock also fails to disclose or suggest or provide any reason for one of ordinary skill in the art to provide a sample unloading chamber that defines an opening in a microfluidic device, where at least a portion of the first and second electrodes is in the opening, as recited in claim 15, and, thus, claim 18. Adcock further fails to disclose or suggest or provide any reason for one of ordinary skill in the art to provide a sample unloading chamber, and a section of matrix material in the sample unloading chamber, where the section of matrix material is only present in a sample unloading chamber, as recited in claim 20 and, thus, claim 23. Therefore, even if the disclosure of Adcock was combined

with that of Wiktorowicz, the resulting combination would not provide the presently claimed invention.

Therefore, as Wiktorowicz and Adcock, whether taken alone or in combination, provide no reason for one of ordinary skill in the art to obtain the presently claimed invention, the present claims are not obvious over those references. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 8, 14, 18, and 23 under 35 U.S.C. § 103(a) over Wiktorowicz and Adcock.

With regard to the rejection of claims 11, 12, 25, and 26 under 35 U.S.C. § 103(a) over Wiktorowicz in view of Gautsch, Gautsch does nothing to overcome the deficiencies of Wiktorowicz. Applicants note that claim 12 depends from claim 11, which depends from claim 5, and claim 26 depends from claim 25, which depends from claim 20.

At column 3, lines 10 to 17, as cited by the Final Office Action, Gautsch discloses:

The fragments are separated by slab gel electrophoresis, or the improved capillary gel electrophoresis methods employing agarose or polyacrylamide gels. In either method, the fragments in each of the four sets are loaded in adjacent lanes of a slab gel, or capillary tube, and separated by electrophoresis.

Therefore, Gautsch discloses slab gel or capillary gel electrophoresis. Gautsch does not disclose or suggest or provide any reason for one of ordinary skill in the art to provide a fluid reservoir configured for unloading a sample of separated charged molecules from a microfluidic, as recited in claim 5, and, thus, in claims 11 and 12, or to provide a sample unloading chamber, and a section of matrix material in the sample unloading chamber, where the section of matrix material only present in a sample unloading chamber, as recited in claim 20 and, thus, in claims 25 and 26. Therefore, even if the disclosure of Gautsch was combined with that of Wiktorowicz, the resulting combination would not provide the presently claimed invention.

Therefore, as Wiktorowicz and Gautsch, whether taken alone or in combination, provide no reason for one of ordinary skill in the art to obtain the presently claimed invention, the present claims are not obvious over those references. Accordingly, it is respectfully requested that the Examiner withdraw the rejection of claims 11, 12, 25, and 26 under 35 U.S.C. § 103(a) over Wiktorowicz and Gautsch.

Applicants thus submit that the entire application is now in condition for allowance, an early notice of which would be appreciated. Should the Examiner not agree

with Applicants' position, a personal or telephonic interview is respectfully requested to discuss any remaining issues prior to the issuance of a further Office Action, and to expedite the allowance of the application.

A separate Petition for Extension of Time and a Request for Continued Examination are submitted herewith. Should any other fees be due, however, please charge such fees to Deposit Account No. 11-0600.

Respectfully submitted,

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